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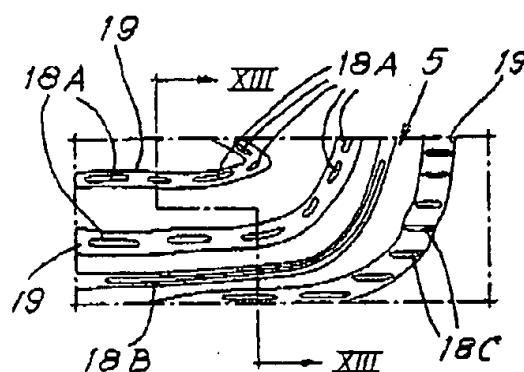
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(54) Title: FLOOR COVERING, FLOOR PANELS, METHOD FOR THEIR REALIZATION

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(57) Abstract: Floor covering, consisting of hard panels, with a laminated structure, whereby at least at the upper surface a printed decorative layer (16) with a wood pattern (5) is present, with thereupon a transparent layer of synthetic material (17) in which impressions (18A-18B-18C) are formed, characterized in that the impressions (18A-18B-18C) substantially follow the wood pattern (5).

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FLOOR COVERING, FLOOR PANELS, METHOD FOR THEIR REALIZATION

5 This invention relates to a floor covering, more particularly of the type consisting of hard panels, as well as to floor panels for forming such floor covering, and a method for realizing such floor panels.

10 In particular, it relates to a floor covering formed of laminated panels, also called laminated parquet.

15 It is known that with such laminated parquet, the appearance of wood is imitated by providing the floor panels at their upper surface with a decorative layer printed with a wood pattern, on top of which a transparent layer of synthetic material is provided.

20 Mostly, the printed decorative layer consists of printed paper. Usually, the layer of synthetic material consists of an synthetic resin or one or more transparent or translucent material layers soaked in synthetic resin, in which possibly products can be worked in, in order to enhance, for example, the wear and tear resistance of the final surface.

25 The printed decorative layer and the layer of synthetic material are provided on an underlying basic layer, which can be realized according to different techniques.

30 So, for example, this is possible by soaking the decorative layer in resin and bringing it, after hardening, together with said layer of synthetic material, which then preferably also consists of a thin transparent paper layer also soaked in resin, and together with a basic layer and possible other layers,

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into a press and compressing it, under the supply of heat, to one hardened whole. This technique is known under the denomination of DPL (Direct Pressure Laminate).

5 Of course, other techniques are possible, too. So, for example, first a top layer may be formed which, amongst others, comprises the aforementioned decorative layer and the layer of synthetic material present thereupon, after which this top layer is attached on a basic layer or
10 basic structure.

Also, said basic layer may consist of different materials or material layers. A material often used to this end is MDF (Medium Density Fibre board), HDF (High Density Fibre
15 board), respectively.

It is also known that impressions can be realized in the transparent layer of synthetic material, this in order to obtain an imitation of wood pores and other unevennesses
20 which can be present at the surface of real wood. With the known embodiments, this is performed by simply providing a series of impressions in the floor panels, which impressions substantially extend according to one and the same direction. Notwithstanding the use of such
25 impressions, the known embodiments show the disadvantage that the imitation effect still is not optimum. So, for example, they show the disadvantage that, if one looks at such floor panels at a relatively small angle, a light refraction at the transparent layer of synthetic matter is created, as a result of which only a glossy surface
30 can be seen, without any visible effect of the actual print being perceived.

The invention aims at a floor covering, and more particularly at floor panels, whereby the top layer has technical characteristics which contribute to a considerable
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improvement of the imitation of the wood pattern, or at least the visual perception of this wood pattern, and whereby the aforementioned disadvantages of the known embodiments are minimized.

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- To this aim, the invention thus relates to a floor covering, consisting of hard panels, with a laminated structure, whereby at least at the upper surface a printed decorative layer with a wood pattern is present,
10 with thereupon a transparent layer of synthetic material in which impressions are formed, with as a characteristic that the impressions substantially follow the wood pattern, with which it is meant that they substantially are provided in function of the wood pattern. Hereby, it
15 is preferred that the impressions follow the wood pattern substantially in longitudinal direction as well as substantially in transverse direction and in directions situated in between.
20 Thereby, a technical solution is offered for letting the printed pattern seem more real, without the necessity of refining the printing technique itself in an expensive manner, which is very important with laminated panels provided with such printed pattern. By having the
25 impressions run not only substantially according to one well-defined direction, then, when a person moves over the floor covering, an effect is obtained that the light incidence moves, as a result of which, so to speak, a living light effect is created. Also, a better depth effect is obtained, and the colours of the printed
30 pattern are better perceptible.

As usual with the known laminated parquet panels, the printed decorative layer preferably consists of paper, however, other materials, either on the basis of cellulose or not, are not excluded. Moreover, this
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decorative layer can be processed in different manners, for example, previous to the application thereof on the underlying basic layer, soaked in a synthetic resin or such.

5

The aforementioned layer of synthetic material, which, according to the invention, is situated on top of the decorative layer, can be composed in any manner. By "transparent layer of synthetic material", it is meant 10 that this layer comprises synthetic material, as well as, in applied condition, is sufficiently transparent for perceiving the printed wood pattern. This layer of synthetic material itself may comprise other materials than synthetic material, as well as be composed of 15 several sublayers.

Preferably, this transparent layer of synthetic material, as usual with known laminated parquet panels, consists of 20 a synthetic resin or one or more transparent or translucent material layers soaked in synthetic resin, for example, very thin transparent layers of paper.

In the layer of synthetic material, substances may be 25 present by which the wear and tear resistance of the surface is enhanced.

Although the invention aims at impressions which substantially follow the printed wood pattern, it is evident that this inventive idea can be realized in 30 different ways.

So, for example, impressions can be applied which are bent or curved and which follow the bent shapes of the wood pattern.

35

Also, opposite to the known embodiments, whereby mostly

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relatively short impressions are applied, now longer impressions can be applied, for example, with lengths of 3 cm or more, or even over the entire length of a wood nerve.

5

It is noted that by the term "wood pattern", different aspects of such wood pattern can be understood. So, for example, may the impressions, or at least a number of the impressions, be provided in function of the course of the
10 wood nerves of the printed wood pattern, however, according to a variant, which either can be combined with the preceding or not, impressions are provided which are applied in function, and more particularly at the location, of the so-called wood pores of the printed wood
15 pattern. Wood pores mostly are dark, often strip-shaped specks in wood, which up to now have been particularly difficult to imitate. In the first place, this problem is pertinent when imitating oak, where often less nerves are present, however, the wood pores are very important. By
20 providing, according to the invention, impressions at the location of these wood pores, the imitated specks will almost have the look of real pores.

In the most preferred forms of embodiment, the floor
25 covering, and more particularly each floor panel concerned, will be provided with impressions which are obtained by means of a pressing mould, more particularly pressing plate, the relief of which was realized by means of image-processing technology, starting from a wood
30 pattern, either an image of a wood pattern or a real wood pattern. Hereby, one starts from the same wood pattern than the one of the print of the decorative layer.

Of course, the invention also relates to floor panels for
35 realizing the floor covering described in the foregoing.

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Further, the invention also relates to a method for realizing such floor panel, which method is characterized in that the aforementioned impressions are applied in said layer of synthetic material by means of a pressing mould, more particularly a pressing plate. Of course, the pressing plate is provided with a relief, more particularly protruding parts, such that impressions are formed which, as aforementioned, follow the printed wood pattern and/or are realized in function of this wood pattern.

Preferably, hereby use is made of a pressing mould, more particularly a pressing plate, the relief of which was realized by means of image-processing technology, starting from a wood pattern, either an image of a wood pattern or a real wood pattern. By realizing said relief by means of image-processing, a true copy is obtained. More particularly, for forming, on one hand, the pressing plate and, on the other hand, the patterns to be printed, it is started from one and the same wood pattern, with the advantage that the relief and the printed pattern can be perfectly attuned to each other.

Of course, the results obtained by image-processing can be processed further.

It is also not excluded to determine the locations where the impressions have to be realized and therefore also the relief of the pressing plate in other ways, for example, by starting from an image of a wood pattern, to determine the locations and shapes of the desired impressions, either by means of or with the support of a computer program.

According to the invention, during image-processing, preferably a separation is performed, on one hand, for

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forming one or more image layers and, on the other hand, for forming one or more structural layers. A separation for image layers already is a known technique and is necessary for being able to print the different colours.

5 According to the invention, now still an additional separation is performed for the aforementioned structural layers, in other words, for forming said relief at the pressing plate or such. To this end, an image of the wood pattern is made and, by means of image-processing
10 technology, an image is formed therefrom which determines the position, and possibly also the depth and the size, of the impressions, after which, by means thereof, a pressing plate is realized, for example, by means of etching techniques or any other technique. It is evident
15 that for the image processing for creating, starting from, for example, the pattern of a real piece of wood, an image which is suitable for forming the relief, different image-processing programs, possibly especially designed to this aim can be applied.

20 Preferably, the floor panels are realized according to the classical technique which is applied for forming DPL (Direct Pressure Laminate), with the only difference that a pressure mould, more particularly, a pressing plate is
25 applied in the usual production press which is provided with a relief by which impressions, such as mentioned in the foregoing, are formed. As usual, the floor panels hereby are formed from larger plates. These plates are formed by bringing a basic layer, more particularly a
30 base plate, together with the decorative layer and the layer of synthetic material, and possible other layers, in a heated press and compressing them to a whole, whereby said synthetic resins provide for adhesion and hardening. Simultaneously to pressing, the impressions
35 are applied, as the press, at the surface of the pressing part which comes into contact with the upper side of the

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aforementioned plate, is provided with said pressing plate comprising the relief which is necessary for applying impressions in accordance with the invention.

- 5 Preceding the pressing, according to the present invention, preferably a positioning is performed between, on one hand, the decorative layer and, on the other hand, the applied pressing plate, in order to position the printed pattern on the decorative layer and the pattern 10 present at the pressing plate over each other.

Practically, the positioning preferably is performed by shifting the base plate, together with the decorative layer and layer of synthetic material present thereupon, 15 until they obtain the desired position.

The aforementioned positioning may be performed in different manners, however, it can be realized in a particular manner by performing such positioning by means 20 of one or more marks provided on the decorative layer.

With the intention of better showing the characteristics of the invention, hereafter, as an example without any limitative character, several preferred forms of embodiment are described, with reference to the 25 accompanying drawings, wherein:

- 30 figure 1 schematically represents a part of a floor covering which is composed of panels according to the invention;
- figure 2 represents a panel of the floor covering from figure 1 in plan view;
- figures 3 and 4 represent cross-sections according to lines III-III and IV-IV in figure 2, respectively;
- 35 figure 5, at a larger scale, represents a cross-section according to line V-V in figure 1;

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figure 6, at a larger scale, represents a cross-section according to line VI-VI in figure 1;

figure 7, at a larger scale, represents the part indicated by F7 in figure 6;

5 figure 8 represents a view analogous as in figure 7, but whereby the panels are shifted towards each other substantially in one and the same plane;

figure 9, in cross-section, represents another panel according to the invention, with bevels provided with
10 a print;

figure 10 schematically represents how the print in the embodiment of figure 9 can be provided;

figure 11 schematically represents a cross-section according to line XI-XI in figure 10;

15 figure 12, at a larger scale, represents the upper surface of a floor panel according to the invention, in particular the part indicated by F12 in figure 2;
figure 13 represents a cross-section according to line XIII-XIII in figure 12;

20 figure 14 schematically represents how plates can be realized from which floor panels according to the invention can be formed.

As represented in figures 1 and 2, the invention relates
25 to a floor covering 1, as well as to hard panels, more particularly floor panels 2, from which such floor covering 1 is assembled, whereby these floor panels 2, at their top side 3 or decorative side, are provided with a top layer 4 with a printed wood pattern 5.

30 In the represented example, the floor panels 2 are rectangular, however, it is clear that they, according to not-represented variants, also can have another shape, for example, can be square or polygonal.

35 Preferably, the floor panels 2, at least at two opposite

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edges 6-7, and even better, as represented in figures 2 to 8, at both pairs of edges 6-7, 8-9, respectively, are provided with coupling means 10, by means of which several of such floor panels 2 mutually can be coupled, 5 such that these coupling means 10 provide for a locking according to a direction R1 perpendicular to the plane of the floor covering 1, as well as in a direction R2 perpendicular to the edges 6-7 and/or 8-9 concerned and parallel to the plane of the floor covering 1.

10

Hereby, such coupling means 10 can be realized such that the different floor panels 2 mutually can be coupled by means of translation movements T1 and/or T2 and/or pivoting movements W1, such as indicated in figure 1, as 15 well as made clear in figures 6 to 8.

Such coupling means 10 which allow a glue-free mutual coupling of the floor panels 2, as well as an uncoupling thereof, are already known in themselves from the 20 international patent application WO 97/47834.

It is noted that the present invention, however, is not limited to floor parts with coupling means 10 which provide for a mechanical locking in the directions R1 and 25 R2, but in fact also can relate to floor panels which are provided with other coupling means, for example, with a classical tongue and groove which can be glued into each other, or even to floor panels comprising no coupling means at all.

30

Besides, the floor panels 2 either can be provided with additional particularities or not, such as bevels 11 at the upper edges, for example, such as represented in figures 3 to 10, on which, as specifically illustrated in figures 9 and 10, either a decorative layer 12 is provided or not, for example, by means of transfer

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printing, whereby, such as schematically represented in figures 10 and 11, a print layer 13, which is present on a carrier, is transferred to the surface of the bevels 11, for example, by means of a heated pressing roll 15.

5

The actual invention to which the present application is relating, is represented schematically in figures 12 and 13.

10 The particularity thereby consists in that at the top side of the floor panels 2, a decorative layer 16 is present, with thereover a transparent layer of synthetic material 17, in which impressions 18A-18B-18C are formed. Hereby, the decorative layer 16 and the layer of 15 synthetic material 17 are of the kind as described in the introduction and together form the top layer 4 indicated schematically in figures 3 to 10.

20 According to the invention, the impressions 18A-18B-18C follow the printed wood pattern 5, preferably substantially in longitudinal direction as well as substantially in transverse direction and in directions situated in between.

25 As represented in figure 13, the impressions 18A-18B-18C preferably only extend up to such a depth that they are situated above the printed decorative layer 16.

30 As indicated by 18A and 18C, the impressions may consist of successive short impressions, or, as represented by 18B, of longer, uninterrupted, possibly bent impressions. Of course, other designs are not excluded. However, it is important that the location and/or shape of the impressions is in function of the wood pattern 5, with 35 which it is meant in the first place that these impressions are realized in function of the wood nerves

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and/or in function of the wood pores.

- In the case of short impressions, these, such as indicated by 18A, can be directed with their length according to the printed wood nerve 19 or, as indicated by 18C, also be directed with their longitudinal direction otherwise, however, positioned such that their configuration globally follows the wood nerve 19.
- 10 It is noted that the three possibilities of impressions 18A-18B-18C represented in figure 12 are not limitative. Also, these will normally not be applied in combination with each other, but one well-defined type 18A or 18B or 18C or another configuration will be used.

15 According to a variant, the impressions, instead of at the wood nerve 19 itself, also can be situated in the zones formed therebetween, and/or at the transitions between the wood nerve 19 and the zones situated 20 therebetween and/or at locations where so-called wood pores are depicted.

In figure 14, a form of embodiment of the method for realizing said floor panels 2, described in the introduction, is represented schematically.

As represented, the impressions concerned, for example 18A and/or 18B and/or 18C, hereby are formed by using a pressing mould, more particularly a pressing plate 20, 30 which, at the side intended for coming into contact with the products to be treated, is provided with a suitable relief 21.

First, during production, large plates are manufactured, 35 from which several floor panels 2 can be formed, more particularly can be sawn therefrom, which subsequently

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can be provided with coupling means 10, for example, by means of a milling treatment.

For forming said plates, as schematically represented in 5 figure 14, at least a printed decorative layer 16 and a layer of synthetic material 17 are provided on a base plate 22, such in a press 23, after which the whole is compressed by means of the pressing plate 20, preferably while supplying heat.

10

According to the invention, previous to pressing, a positioning is performed between, on one hand, the decorative layer 16 and, on the other hand, the applied pressing plate 20, in order to position the printed 15 pattern on the decorative layer 16 and the pattern present at the pressing plate 20 over each other.

In the example, this positioning is performed by shifting the base plate 22, together with the decorative layer 16 20 and layer of synthetic material 17 present thereon, until the desired position is achieved. This positioning is realized by means of one or more adjustable stops 24 against which the base plate 22, with the decorative layer 16 and layer of synthetic material 17 present 25 thereupon, and possible other layers, is positioned, possibly by means of marks which are applied on the decorative layer 16, which are perceived by means of one or more sensors 25, and whereby, by means of control means 26 and in function of the signals obtained from the 30 sensors, it is provided for the control of driving means 27 of the movable stops 24.

Obviously, the positioning can be achieved in the two directions of the plane of the base plate 22.

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It is evident that, according to a variant, the layer of

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synthetic material and the decorative layer, already before their application on the base plate, may consist of a single layer, for example, in that the decorative layer is soaked such that sufficient synthetic material 5 is present thereupon in order to form impressions therein. It is also not excluded to start from a layer of synthetic material which is provided with a decorative layer at the underside, which layer is exclusively formed by a print. The term print must be interpreted in the broadest sense, and thereby any technique is intended 10 with which an image of a wood pattern can be realized.

Also, other layers may be taken up in the top layer, such as, for example, a layer of white paper, also impregnated 15 with resin, which is provided under the decorative layer, which has the purpose of forming a neutral underground.

The present invention is in no way limited to the forms of embodiment described as an example and represented in 20 the figures, on the contrary may such floor covering, and more particularly said panels, as well as said method, be realized in different variants without leaving the scope of the invention.

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Claims.

- 1.- Floor covering, consisting of hard panels, with a
5 laminated structure, whereby at least at the upper
surface a printed decorative layer (16) with a wood
pattern (5) is present, with thereupon a transparent
layer of synthetic material (17) in which impressions
10 (18A-18B-18C) are formed, characterized in that the
impressions (18A-18B-18C) substantially follow the wood
pattern (5).
- 2.- Floor covering according to claim 1, characterized in
that the impressions (18A-18B-18C) follow the wood
15 pattern (5) substantially in longitudinal direction as
well as substantially in transverse direction and
directions situated in between.
- 3.- Floor covering according to any of the preceding
20 claims, characterized in that the transparent layer of
synthetic material (17) consists of a synthetic resin,
whether or not in the form of one or more transparent or
translucent material layers soaked in synthetic resin.
- 4.- Floor covering according to any of the preceding
25 claims, characterized in that the impressions (18A-18B-
18C) extend up to a depth, such that they still are
situated entirely above the decorative layer (16).
- 30 5.- Floor covering according to any of the preceding
claims, characterized in that among the aforementioned
impressions (18A-18B-18C), there are bent impressions
(18B) which follow the bent shape of the wood pattern
(5).
- 35 6.- Floor covering according to any of the preceding

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claims, characterized in that among the aforementioned impressions, there are longer uninterrupted impressions (18B) with lengths of 3 cm or more.

5 7.- Floor covering according to any of the preceding claims, characterized in that the impressions (18A-18B-18C) are provided at least in function of the course of the wood nerves (19) of the printed wood pattern (5).

10 8.- Floor covering according to any of the preceding claims, characterized in that the aforementioned impressions comprise successive short impressions (18A-18C) which, globally, follow the nerves (19) of the wood pattern (5).

15 9.- Floor covering according to any of the preceding claims, characterized in that the impressions are provided at least in function of and, more particularly, at the location of the so-called wood pores of the 20 printed wood pattern (5).

10. - Floor covering according to any of the preceding claims, characterized in that it is provided with impressions (18A-18B-18C) which are obtained by means of 25 a pressing mould, more particularly pressing plate (20), the relief (21) of which was realized by means of image-processing technology, starting from a wood pattern, either an image of a wood pattern or a real wood pattern.

30 11.- Floor panel, characterized in that it shows characteristics as described in one or more of the preceding claims and therefore allows to realize a floor covering (1) according to any of the preceding claims.

35 12.- Method for realizing a floor panel according to claim 11, characterized in that, during the production

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process of this floor panel (2), the impressions (18A-18B-18C) concerned are provided in said layer of synthetic material (17) by means of a pressing mould, more particularly a pressing plate (20).

5

13.- Method according to claim 12, characterized in that use is made of a pressing mould, more particularly pressing plate (20), the relief (21) of which was realized by means of image-processing technology, 10 starting from a wood pattern (5), either an image of a wood pattern (5) or a real wood pattern (5).

14.- Method according to claim 13, characterized in that for forming, on one hand, the pressing plate (20) and, on 15 the other hand, the patterns to be printed, one starts from one and the same wood pattern (5).

15.- Method according to claim 14, characterized in that, 20 by means of image-processing, a separation is performed, on one hand, for forming one or more image layers and, on the other hand, for forming one or more structural layers.

16.- Method according to any of the claims 12 to 15, 25 whereby the floor panels (2) are formed of larger plates and whereby during the formation of these plates, at least one printed decorative layer (16) and a layer of synthetic material (18) are provided on a base plate (22), whereby, when said layers are pressed onto the base plate (22), heat is supplied and simultaneously said impressions (18A-18B-18C) are formed, characterized in 30 that previous to the pressing, a positioning is performed between, on one hand, the decorative layer (16) and, on the other hand, the applied pressing plate (20), in order 35 to position the printed pattern on the decorative layer (16) and the pattern present on the pressing plate (20)

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in respect to each other.

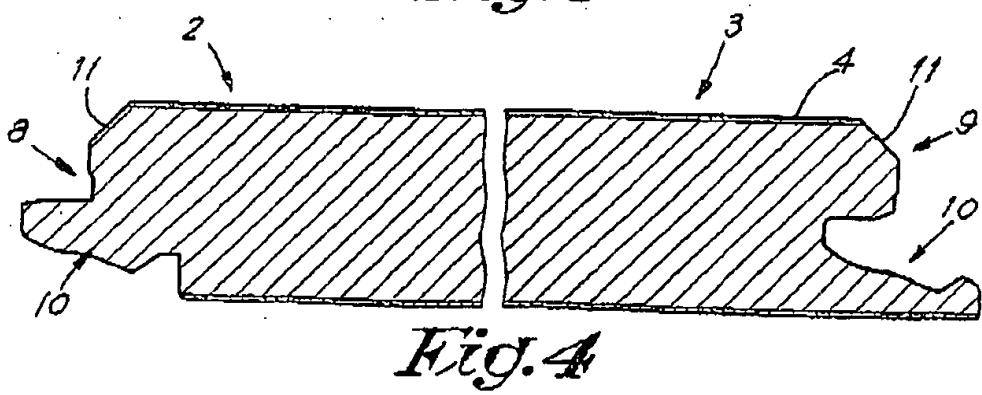
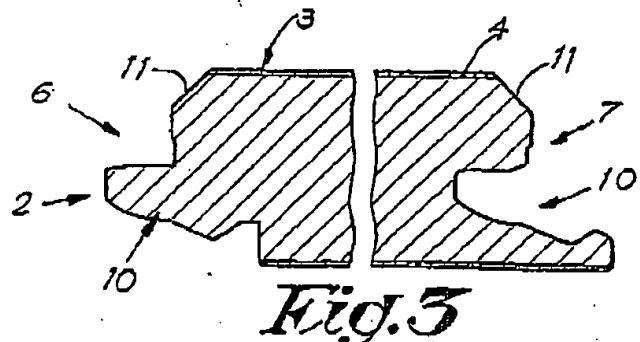
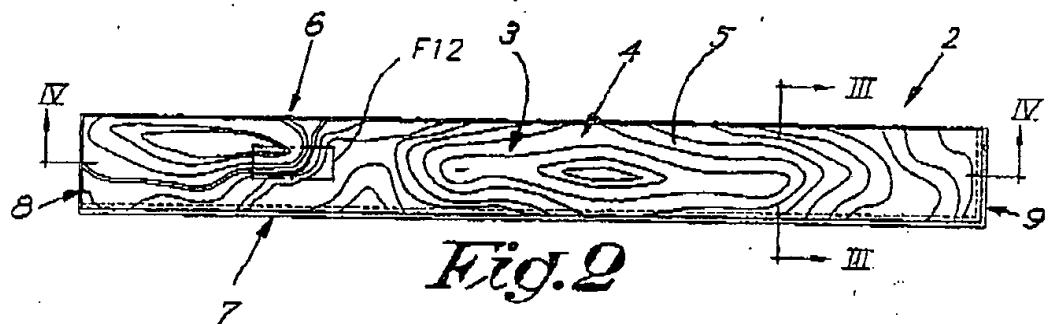
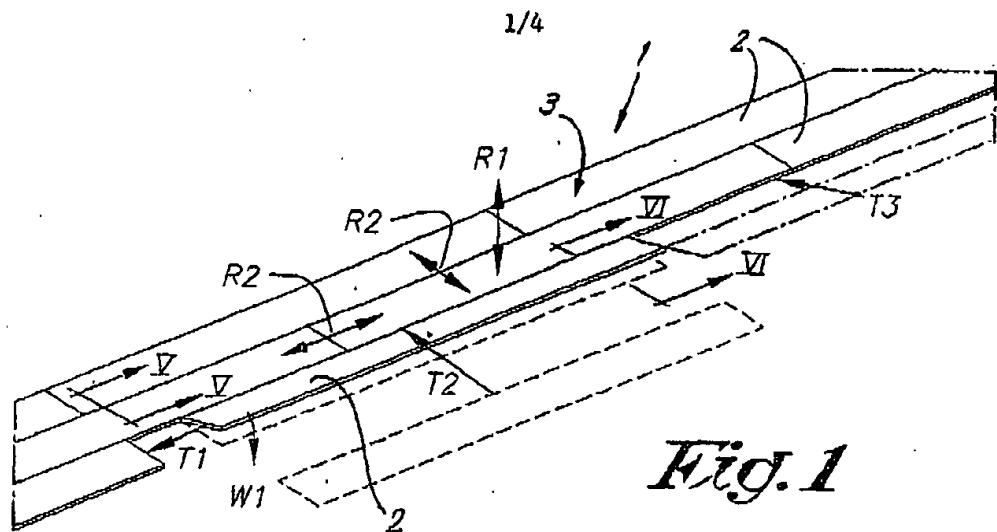
17.- Method according to claim 16, characterized in that
the positioning takes place by shifting the base plate
5 (22), together with the decorative layer (16) and layer
of synthetic material (17) present thereon until the
desired position is achieved.

18.- Method according to claim 17, characterized in that
10 the positioning of the base plate (22) and the decorative
layer (16) and layer of synthetic material (17) present
thereon is performed by means of one or more adjustable
stops (24) against which the base plate (22), together
with the decorative layer (16) and layer of synthetic
15 material (17) present thereon, is positioned.

19.- Method according to any of the claims 16 to 18,
characterized in that the positioning is performed by
means of one or more marks provided on the decorative
20 layer (16).

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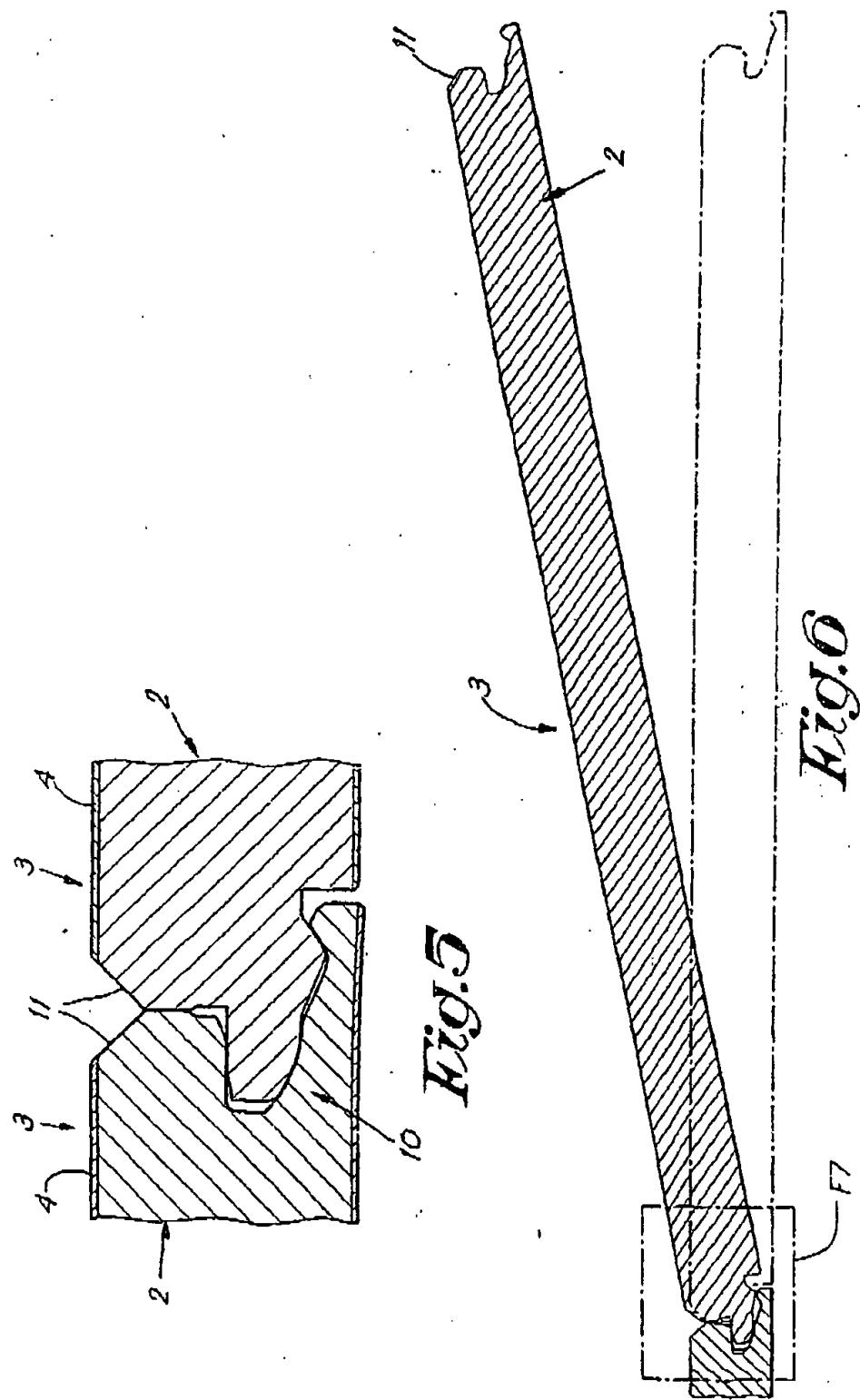
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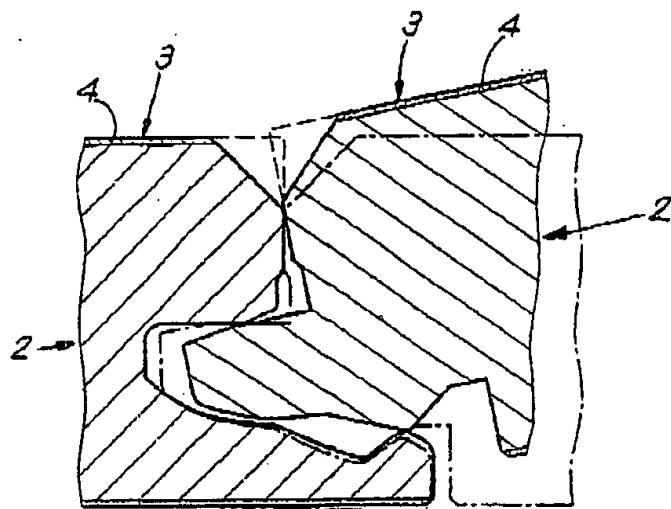
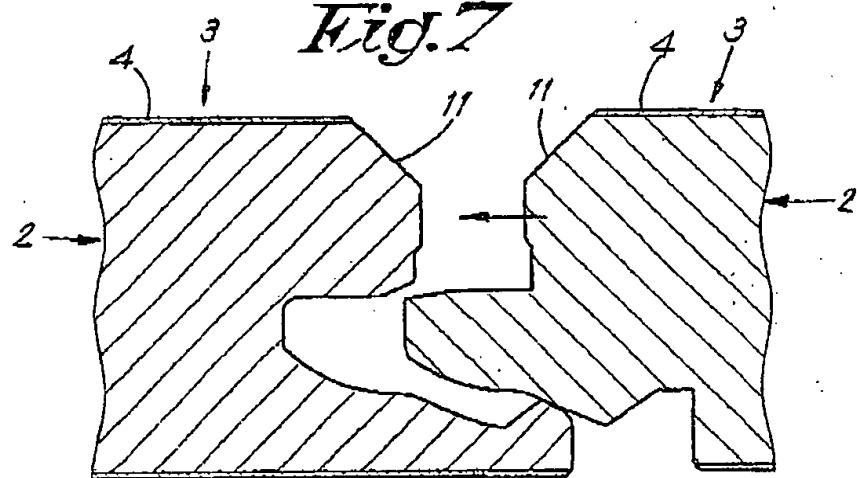
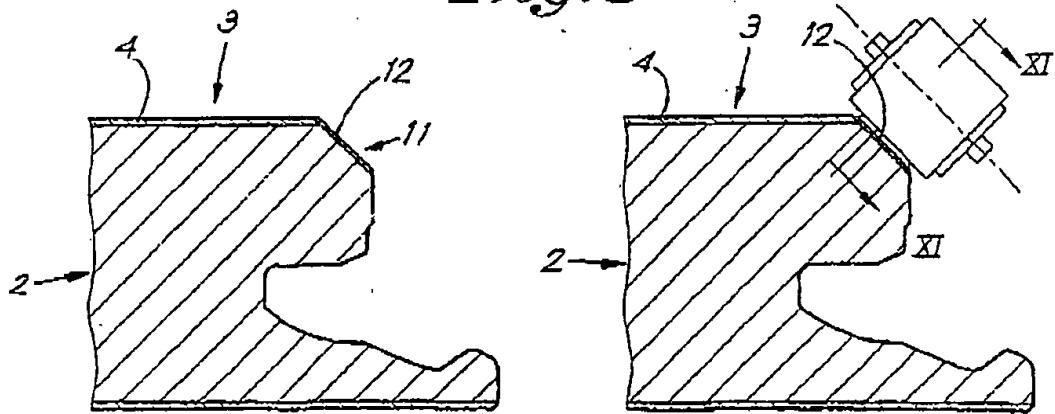
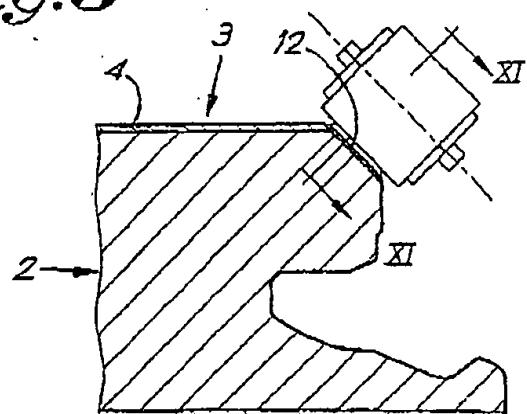
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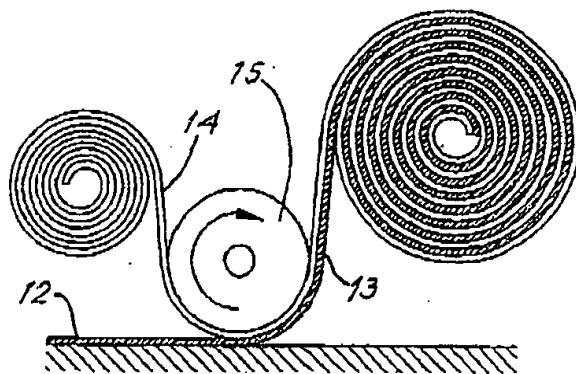
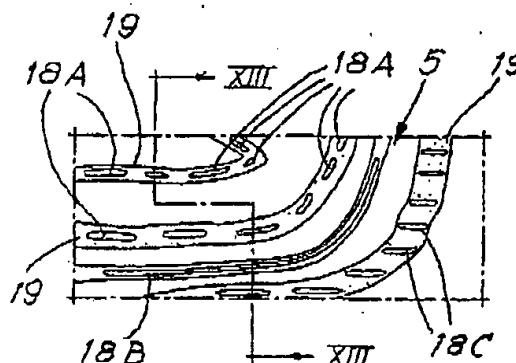
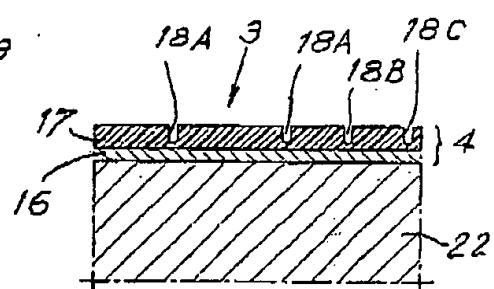
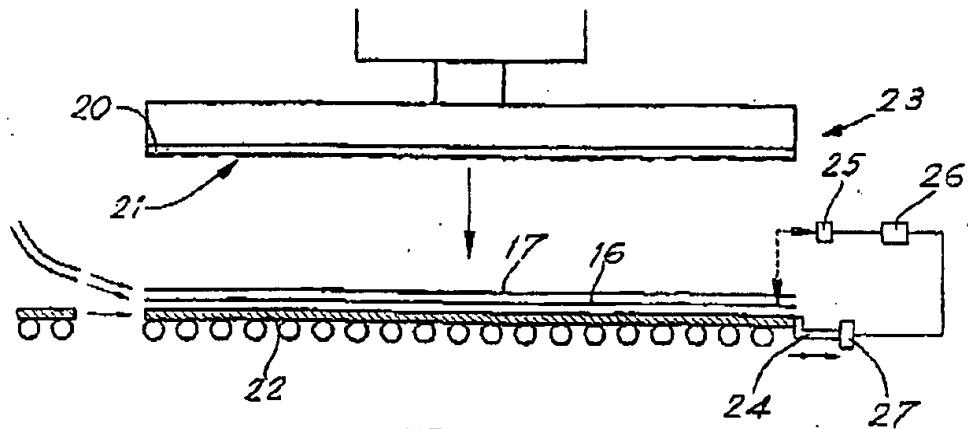
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*Fig. 7**Fig. 8**Fig. 9**Fig. 10*

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*Fig. 11**Fig. 12**Fig. 13**Fig. 14*

INTERNATIONAL SEARCH REPORT

Int'l Application No
PCT/BE 01/00097

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 E04F15/04 B44F9/02 B44C5/04 B44C1/24

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 E04F B44F B44C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 237 087 A (JONES DONALD B) 2 December 1980 (1980-12-02) column 1, line 6 -column 2, line 64; examples 1,2	1-5, 7-14,16
A	US 5 804 285 A (KOBAYASHI TOSHITAKE ET AL) 8 September 1998 (1998-09-08) column 3, line 14 -column 8, line 40; figures 1-12D; example 1	1-5,7,8, 10,12-16

Further documents are listed in the continuation of box C.

Patent family members are listed in Annex.

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Date of the actual completion of the International search

Date of mailing of the International search report

28 September 2001

08/10/2001

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Information on patent family members

In al Application No
PCT/BE 01/00097

Patent document cited in search report		Publication date		Patent family member(s)		Publication date
US 4237087	A	02-12-1980	NONE			
US 5804285	A	08-09-1998	JP GB	8001895 A 2291007 A , B	09-01-1996 17-01-1996	